Normal and inverse magnetocaloric effect in the melt-spun $Y_{1-x}Tb_xCo_2$ ($0 \leqslant x \leqslant 1$) alloys

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YCo_2 compound is an exchange-enhanced Pauli paramagnet on the verge of being a magnet. Ferromagnetic long-range ordering can be induced by topological or chemical disorder. The influence of Tb substitution on the magnetic properties of $Y_{1-x}Tb_xCo_2$ ($0 \leqslant x \leqslant 1$) compounds are studied by means of X-ray diffraction and vibrating sample magnetometry. Magnetic properties depend on the introduced structural disorder and may differ from the properties of structurally stable counterparts [1]. The system investigated crystallizes in $MgCu_2$-type Laves phase (Fdm space group). Magnetic entropy changes $\Delta S_M(T, \mu_0 H)$ and refrigerant capacity RC are determined on the basis of $M(H)$ curves to characterize magnetocaloric effect (MCE). For $Tb_{0.6}Y_{0.4}Co_2$ compound ($T_C = 156$ K) in as-quenched state the ΔS_{Mpk}, δT_{fwhm} and RC are equal to 5.95 J/kgK, 49 K and 104 J/kg, respectively (magnetic field changes from 0 to 5 T). The temperature dependence of real and imaginary components of AC susceptibility and heat capacity measurements suggest the presence of parimagnetic ordering above the Curie temperature. Structural disorder broadens the magnetic transition and the temperature-dependent magnetic entropy changes in the compounds investigated and moreover is the prerequisite of the parimagnetic ordering [2].

References:

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